Appendix NJ – Acceptance Requirements for Nonresidential Buildings[1]

NOTE: THIS APPENDIX IS ENTIRELY NEW AND UNDERLINES AND STRIKETHROUGHS ARE ELIMINATED FOR CLARITY OF READING.

NJ1. Purpose and Scope

ACM NJ defines acceptance procedures that must be completed before credit can be claimed for certain compliance measures. The procedures apply to nonresidential, high-rise residential and hotel/motel buildings as defined by the CEC Building Energy Efficiency Standards.

NJ2. Introduction

Acceptance Requirements are defined as the application of targeted inspection checks and functional and performance testing conducted to determine whether specific building components, equipment, systems, and interfaces between systems conform to the criteria set forth in the Standards and to related construction documents (plans or specifications). Acceptance Requirements can effectively improve code compliance and help determine whether equipment meets operational goals and whether it should be adjusted to increase efficiency and effectiveness.

This section describes the process for completing the Acceptance Requirements. The steps include the following:

- Document plans showing sensor locations, devices, control sequences and notes,
- Review the installation, perform acceptance tests and document results, and
- Document the operating and maintenance information, complete installation certificate and indicate test results on the Certificate of Acceptance, and submit the Certificate to the building department prior to receive a final occupancy permit.

Acceptance testing is not intended to take the place of commissioning or test and balance procedures that a building owner might incorporate into a building project. It is an adjunct process focusing only on demonstrating compliance with the Standards.

The installing contractor, engineer of record or owners agent shall be responsible for reviewing the plans and specifications to assure they conform to the Acceptance Requirements. This is typically done prior to signing a Certificate of Compliance.

The installing contractor, engineer of record or owners agent shall be responsible for providing all necessary instrumentation, measurement and monitoring, and undertaking all required acceptance requirement

---

[1] The New Buildings Institute produced this report for the California Energy Commission under Contract 400-00-043. The project was funded through a Special Energy Projects Grant from the US Department of Energy's Office of Building Technologies, State and Community Programs. Tav Commins is the California Energy Commission Project Manager.

The New Buildings Institute's Jeff Johnson managed this project. Subcontractors on this project were: Portland Energy Conservation, Inc. (Amanda Potter, Tudi Haasl, and Larry Luskay); Don Felts Energy Consultant; and Architectural Energy Consultants (Pete Jacobs).

The following individuals reviewed and advised the project: Jeff Johnson and Mark Williams, New Buildings Institute; Bryan Alcorn, Tav Commins, Jonathan Leber, and Bill Pennington, California Energy Commission; Mark Hydeman, Glenn Friedman and Steve Taylor, Taylor Engineering, Ken Gillespie, Steve Blanc, and Misti Bruceri, PG&E, Mary Ann Piette. LBNL, Charles Eley, Eley Associates, .and Doug Mahone, HMG.

procedures. They shall be responsible for correcting all performance deficiencies and again implementing the acceptance requirement procedures until all specified systems and equipment are performing in accordance with the Standards.

The installing contractor, engineer of record or owners agent shall be responsible for documenting the results of the acceptance requirement procedures including paper and electronic copies of all measurement and monitoring results. They shall be responsible for performing data analysis, calculation of performance indices and crosschecking results with the requirements of the Standard. They shall be responsible for issuing a Certificate of Acceptance. Building departments shall not release a final Certificate of Occupancy until a Certificate of Acceptance is submitted that demonstrates that the specified systems and equipment have been shown to be performing in accordance with the Standards. The installing contractor, engineer of record or owners agent upon completion of undertaking all required acceptance requirement procedures shall record their State of California Contractor's License number or their State of California Professional Registration License Number on each Certificate of Acceptance that they issue.

NJ3. Construction Documentation

The construction documents shall contain sufficient information to completely describe the heating, ventilation, and air conditioning (HVAC); lighting; and electric power distribution systems, including operational features and controls. The information required for each system shall include:

1. A description of the systems including the capacities of the equipment or systems.
2. A description of the testing requirements and the criteria for passing to be used for final systems acceptance.
3. A requirement for submittal of operation manuals and maintenance manuals as a condition of final acceptance, and a description of their format and content. The operation manual shall provide all relevant information needed for day-to-day operation and management of each system. The maintenance manual shall describe equipment inventory and support the maintenance program.
4. A requirement for submittal of record drawings and control documents as a condition of final acceptance.

For buildings other than those served by single-zone unitary HVAC systems, documentation shall also include:

1. A description of the design intent providing a detailed explanation of the ideas, concepts and criteria that are defined by the owner to be important.
2. A description of the basis of design of the systems including all information necessary to prepare a design to accomplish the design intent.
3. A description of the sequence of operation of the systems and their interaction with other systems, including fire prevention and fire protection systems.

NJ4. Outdoor Air

NJ4.1 Central Air Handler Outdoor Air Acceptance

Plan Review

Verify the construction documents for the following:

- Outside air ventilation rate meets the Standards for all areas served by the air-handling unit being reviewed.

Construction Inspection

Prior to Acceptance Testing, verify and document the following:

- Outside air flow station is calibrated *OR* a calibration curve of outside air vs. outside air damper position, inlet vane signal, or VFD signal was completed during system TAB procedures.

- Disable economizer control sequences to prevent unwanted interaction while performing tests.

Equipment Start-up

Step 1: Drive all VAV boxes to minimum flow. Verify and document the following:

- Measured outside airflow CFM corresponds to the total value found on the Standards Mechanical Plan Check document MECH-3, Column H or Column I (which ever is greater) within +/- 10%.
- System operation stabilizes within 15 minutes after test procedures are initiated (no hunting).

Step 2: Drive all VAV boxes to maximum flow. Verify and document the following:

- Measured outside airflow CFM corresponds to the total value found on Standards Mechanical Plan Check document MECH-3, Column H or Column I (which ever is greater) within +/- 10%.
- System operation stabilizes within 15 minutes after test procedures are initiated (no hunting).

NJ5. Packaged HVAC Systems

Acceptance requirements apply only to constant volume, direct expansion (DX) packaged systems with gas furnaces or heat pumps.

NJ5.1 Constant Volume Packaged HVAC Systems Acceptance

Plan Review

Verify the Plan Review for the following:

- Mechanical equipment (both heating and cooling, if applicable) must meet or exceed efficiency ratings per Standards Section 112.
- Economizer is specified for all systems as required by Standards
- Specified thermostat includes all zone control features required by Standards Section 122(b).
- Specified equipment includes all system control features required by Standards Section 122(e).
- Specified heat pump includes all system control features required by Standards Section 122(d).
- Specified gas-fired equipment does not have pilot lights.
- Specified thermostat and system controls must allow the economizer to be fully integrated with the unit.
- Specified demand control ventilation system includes all control features required by Standards Section 121c(4).

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Thermostat is located within the zone that the HVAC system serves.
- Space temperature thermostat is factory-calibrated (proof required) or field-calibrated.
- Appropriate temperature deadband has been programmed.
- Appropriate occupied, unoccupied, and holiday schedules have been programmed.
- Outside air flow station is calibrated *OR* minimum outside air flow and damper position is set during system TAB procedures.
- Economizer lockout control sensor, if applicable, is factory-calibrated (proof required) or field-calibrated and setpoint properly set (refer to the *ECONOMIZERS* acceptance requirements section for detail).

- Demand control ventilation controller, if applicable, is factory-calibrated (proof required) or field-calibrated and setpoint properly set (refer to the *DEMAND CONTROL VENTILATION* acceptance requirements section for detail).

Equipment Start-up

Step 1: Simulate heating load during occupied condition. Verify and document the following:

- Supply fan operates continually during occupied condition.
- Gas-fired furnace, if applicable, stages on to satisfy heating space temperature setpoint.
- Heat pump(s), if applicable, stage on to satisfy heating space temperature setpoint.
- Outside air damper is open to the minimum position.
- Measured minimum outside airflow CFM corresponds to the value found on Standards Mechanical Plan Check document MECH-1, Design O.A. CFM within +/- 10%.

Step 2: Simulate "no-load" during occupied condition. Verify and document the following:

- Supply fan operates continually during occupied condition.
- Neither heating or cooling are provided by the unit.
- Outside air damper is open to the minimum position.
- If system is has variable supply air flow capabilities, measured minimum outside airflow CFM corresponds to the value found on Standards Mechanical Plan Check document MECH-1, Design O.A. CFM within +/- 10%.

Step 3: Simulate cooling load and economizer operation, if applicable, during occupied condition.

- Supply fan operates continually during occupied condition.
- Refer to the *ECONOMIZERS* acceptance requirements section for testing protocols.

Step 4: Simulate cooling load and demand control ventilation, if applicable, during occupied condition.

- Supply fan operates continually during occupied condition.
- Refer to the *DEMAND CONTROL VENTILATION* acceptance requirements section for testing protocols.

Step 5: If an economizer is not required, simulate cooling load during occupied condition. Verify and document the following:

- Supply fan operates continually during occupied condition.
- Compressor(s) stage on to satisfy cooling space temperature setpoint.
- Outside air damper is open to the minimum position.

Step 6: Shut the unit off or allow schedule to go unoccupied. Verify and document the following:

- Supply fan turns off.
- Outside air damper closes completely.

Step 7: Simulate heating load during unoccupied condition. Verify and document the following:

- Supply fan cycles on when heating equipment is enabled.
- Outside air damper remains closed.
- Gas-fired furnace, if applicable, stages on to satisfy heating space temperature setpoint.
- Heat pump(s), if applicable, stage on to satisfy heating space temperature setpoint.

- Supply fan cycles off when heating equipment is disabled.

Step 8: Simulate cooling load and economizer operation, if applicable, during unoccupied condition.

- Supply fan cycles on when there is a call for cooling.
- Refer to the *ECONOMIZERS* acceptance requirements section for testing protocols.
- Supply fan cycles off when call for cooling is satisfied.
- Outside air damper closes when unit cycles off.

Step 9: Simulate cooling load and demand control ventilation operation, if applicable, during unoccupied condition.

- Supply fan cycles on when there is a call for cooling.
- Refer to the *DEMAND CONTROL VENTILATION* acceptance requirements section for testing protocols.
- Supply fan cycles off when call for cooling is satisfied.
- Outside air damper closes when unit cycles off.

Step 10: If an economizer is not required, simulate cooling load during unoccupied condition. Verify and document the following:

- Supply fan cycles on when cooling equipment is enabled.
- Outside air damper remains closed.
- Compressor(s) stage on to satisfy cooling space temperature setpoint.
- Supply fan cycles off when cooling equipment is disabled.

Step 11: Simulate manual override during unoccupied condition. Verify and document the following:

- System reverts to “occupied” mode and operates as described above to satisfy a heating, cooling, or no load condition.
- System turns off when manual override time period expires.

NJ6. Air Distribution Systems

Acceptance requirements apply only to qualify for compliance credit for sealed ducts for single-zone packaged systems with ducts installed in unconditioned spaces between insulated ceilings and roofs.

NJ6.1 Air Distribution Acceptance

Plan Review

Verify the Plan Review for the following:

- Specified ducts should be UL 181 listed.
- Specified pressure sensitive tapes, mastics, aerosol sealants, or other closure systems meet applicable requirements of UL 181, 181A, or 181B. Cloth backed rubberized adhesive tapes are prohibited unless used in combination with mastic and drawbands.
- Must comply with Sections 601, 602, 604, 605 and Standard 6-5 of the 2001 CMC.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Flexible duct layout does not have any sharp corners and bends that constrict airflow per CMC.

- Drawbands are either stainless steel worm-drive hose clamps or UV-resistant nylon duct ties.
- Flexible ducts are not constricted in any way (for example pressing against immovable objects or squeezed through openings).
- Duct leakage tests should be performed before access to ductwork and associated connections are blocked by permanently installed construction material.
- Joints and seams are not sealed with a cloth back rubber adhesive tape unless used in combination with mastic and drawbands.
- Duct R-values are verified.
- Insulation is protected from damage and suitable for outdoor service if applicable.

Equipment Start-up

Step 1: Perform duct leakage test per 2001 Nonresidential ACM Approved Manual, Appendix G, Section 4.3.8.2. Certify the following:

- Duct leakage does not exceed 6% of total measured fan flow when tested according to the Nonresidential ACM Manual.

Step 2: Obtain third party field verification as required by Appendix G.

NJ7. Lighting Control Systems

Lighting control testing is performed on:

- Manual Daylighting Controls.
- Automatic Daylighting Controls.
- Occupancy Sensors.
- Automatic Time-switch Control.

NJ7.1 Automatic Daylighting Controls Acceptance

Plan Review

Verify the Plan Review for the following:

- Evaluate potential external shading issues that could affect daylight from entering the space. This includes reviewing landscaping design and physical location of the proposed building and adjacent structures. If exterior obstructions severely reduce the amount of available light, daylight controls are not required.
- Review visible light transmittance for all glazing specified and calculate the *Effective Aperture* for both vertical windows and skylights per the Standards. If the *Effective Aperture* calculation falls below the minimum threshold per the Standards, daylight controls are not required.
- Calculate the daylit area per the Standards and verify and document that all light fixtures within the daylit area are correctly wired to achieve the desired control.
- All manual switches and/or dimmers are wired appropriately per the Standards within the daylit area to achieve the desired control (mandatory requirement unless choose control option).
- All automatic control devices (photosensors) specified within the daylit area are located according to manufacturers recommendations to achieve the desired control (lighting control credit option).[2]

[2] The issue of adequate location of photo-sensing devices to achieve daylight control may require more detailed investigation into design practices and manufacturer's recommended installations.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- All control devices (photocells) have been properly located, factory-calibrated (proof required) or field-calibrated and set for appropriate set points and threshold light levels.
- Installer has provided documentation of setpoints, setting and programming for each device.

Equipment Start-up

Step 1: Simulate bright conditions for a continuous dimming control system. Verify and document the following:

- Lighting power reduction is at least 50% under fully dimmed conditions per Standard Section 119(e)1.
- Automatic daylight control system reduces the amount of light delivered to the space uniformly.
- Dimming control system provides reduced flicker operation over the entire operating range per Standards Section 119(e)2.
- Lumen measurements in the space, location of measurements and specific device settings, program settings and other measurements are documented.

Step 2: Simulate dark conditions for a continuous dimming control system. Verify and document the following:

- Automatic daylight control system increases the amount of light delivered to the space uniformly.
- Dimming control system provides reduced flicker operation over the entire operating range per Standards Section 119(e)2.
- Lumen measurements in the space, location of measurements and specific device settings, program settings and other measurements are documented.

Step 3: Simulate bright conditions for a stepped dimming control system. Verify and document the following:

- Lighting power reduction is at least 50% under fully dimmed conditions.
- Automatic daylight control system reduces the amount of light delivered to the space per manufacturer's specifications for power level verses light level.
- Minimum time delay between step changes is 3 minutes to prevent short cycling.
- Lumen measurements in the space, location of measurements and specific device settings, program settings and other measurements are documented.

Step 4: Simulate dark conditions for a stepped dimming control system. Verify and document the following:

- Automatic daylight control system increases the amount of light delivered to the space per manufacturer's specifications for power level verses light level.
- Stepped dimming control system provides reduced flicker over the entire operating range per Standards Section 119(e)2.
- Minimum time delay between step changes is 3 minutes to prevent short cycling.
- Lumen measurements in the space, location of measurements and specific device settings, program settings and other measurements are documented.

Step 5: Simulate bright conditions for a stepped switching control system. Verify and document the following:

- Lighting power reduction is at least 50% under fully switched conditions per Standards Section 119(e)1.
- Automatic daylight control system reduces the amount of light delivered to the space per manufacturer's specifications for power level verses light level.

- Single- or multiple-stepped switching controls provide a dead band of at least three minutes between switching thresholds to prevent short cycling.
- Lumen measurements in the space, location of measurements and specific device settings, program settings and other measurements are documented.

Step 6: Simulate dark conditions for a stepped switching control system. Verify and document the following:

- Automatic daylight control system increases the amount of light delivered to the space per manufacturer's specifications for power level verses light level.
- Single- or multiple-stepped switching controls provide a dead band of at least three minutes between switching thresholds to prevent short cycling.
- Lumen measurements in the space, location of measurements and specific device settings, program settings and other measurements are documented.

NJ7.2 Occupancy Sensor Acceptance

Plan Review

Verify the Plan Review for the following:

- All occupancy sensors are located appropriately to achieve the desired control intent.
- Total lighting load on each occupancy sensor is within manufacturer' specifications.
- Specified occupancy sensors comply with Standards Section 119 and are listed in the CEC Directory of Certified Ventilation and Lighting Control Devices.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Occupancy sensitivity has been located to minimize false signals.
- Occupancy sensors do not encounter any obstructions that could adversely affect desired performance.
- Ultrasound occupancy sensors do not emit audible sound.

Equipment Start-up

Step 1: For a representative sample of building spaces, simulate an unoccupied condition. Verify and document the following:

- Lights controlled by occupancy sensors turn off within a maximum of 30 minutes from the start of an unoccupied condition per Standard Section 119(d).
- The occupant sensor does not trigger a false "on" from movement in an area adjacent to the controlled space or from HVAC operation.
- Signal sensitivity is adequate to achieve desired control.

Step 2: For a representative sample of building spaces, simulate an occupied condition. Verify and document the following:

- Status indicator or annunciator operates correctly.
- Lights controlled by occupancy sensors turn on immediately upon an occupied condition, *OR s*ensor indicates space is "occupied" and lights are turned on manually (automatic OFF and manual ON control strategy).

NJ7.3 Manual Daylighting Controls Acceptance

Plan Review

Verify the Plan Review for the following:

- Calculate the daylit area per the Standards and verify and document that all light fixtures within the daylit area are correctly circuited and switched to achieve the desired control.
- All automatic control devices (photosensors) specified within the daylit area are located appropriately to achieve the desired control (lighting control credit option).[3]

Construction Inspection

Prior to Performance Testing, verify and document the following:

- If dimming ballasts are specified for light fixtures within the daylit area, make sure they meet all the Standards requirements, including "reduced flicker operation" for manual dimming control systems.

Equipment Start-up

Step 1: Perform manual switching control. Verify and document the following:

- Manual switching achieves the required minimum lighting power reduction, *OR*
- Manual dimming achieves the required minimum lighting power reduction (both per Standard Section 131 (b).

NJ7.4 Automatic Time Switch Control Acceptance

Plan Review

Verify the Plan Review for the following:

- Timed manual override switch shall control an area not exceeding 5,000 square feet of illuminated space or 20,000 square feet of illuminated space in malls, arcades, auditoriums, single tenant retail spaces, industrial facilities and arenas.
- Timed manual override switch shall only control a single area separated by ceiling-height partitions in accordance with Section 131 (a)1 and 2.
- Multi-story buildings have separate control per floor (either independent system or multiple point control system).
- Automatic time switch control system specified by designer is listed in the Directory of Certified Ventilation and Lighting Control Devices.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Automatic time switch control is programmed with acceptable weekday, weekend, and holiday (if applicable) schedules.
- Document for the owner automatic time switch programming including weekday, weekend, holiday schedules as well as all set-up and preference program settings.
- Verify the correct time and date is properly set in the time switch.
- Verify the battery is installed and energized.
- Override time limit is no more than 2 hours.

[3] The issue of adequate location of photo-sensing devices to achieve daylight control may require more detailed investigation into design practices and manufacturer's recommended installations.

Equipment Start-up

Step 1: Simulate occupied condition. Verify and document the following:

- All lights can be turned on and off by their respective area control switch.
- Verify the switch only operates lighting in the ceiling-height partitioned area in which the switch is located.

Step 2: Simulate unoccupied condition. Verify and document the following:

- All non-exempt lighting turn off per Section 131 (d)1.
- Manual override switch allows only the lights in the selected ceiling height partitioned space where the override switch is located, to turn on or remain on until the next scheduled shut off occurs.
- All non-exempt lighting turns off.

NJ8. Air Economizer Controls

Economizer testing is performed on all built-up systems and on packaged systems per Standards Section 144 (e)1. Air economizers installed by the HVAC system manufacturer and certified to the commission as being factory calibrated and tested do not require field testing.

NJ81 Packaged Systems Economizer Acceptance

Plan Review

Verify the Plan Review for the following:

- Economizer is specified for all systems as required by the Standards.
- Proper building pressure relief is provided by fan system or relief dampers.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Economizer lockout control sensor is factory-calibrated (proof required) or field-calibrated (fixed or differential dry-bulb or enthalpy sensor depending on system type)
- Outside air flow station is factory-calibrated (proof required) or field-calibrated *OR* minimum outside air flow is measured and damper position set during system TAB procedures.
- Economizer lockout setpoint complies with Table 144-C per Standards Section 144 (e) 3.
- System controls are wired correctly to ensure economizer is fully integrated (i.e. economizer will operate when mechanical cooling is enabled).
- Economizer lockout control sensor location is adequate (open to air but not exposed to direct sunlight nor in an enclosure; away from sources of building exhaust; at least 25 feet away from cooling towers).
- Relief fan system is wired correctly to operate only when the economizer is enabled.
- If no relief fan system is installed, relief dampers are installed to relieve building pressure when the economizer is operating.

Equipment Start-up

Step 1: Simulate a cooling load and enable the economizer by adjusting the lockout control (fixed or differential dry-bulb or enthalpy sensor depending on system type) setpoint. Verify and document the following:

- Economizer damper modulates opens per Standards Section 144 (e)1A to maximum position to satisfy cooling space temperature setpoint.

- Return air damper modulates closed and is completely closed when economizer damper is 100% open.
- Economizer damper is 100% open before mechanical cooling is enabled.
- Relief fan is operating or relief dampers freely swing open.
- Mechanical cooling is only enabled if cooling space temperature setpoint is not met with economizer at 100% open.

Step 2: Continue from Step 1 and disable the economizer by adjusting the lockout control (fixed or differential dry-bulb or enthalpy sensor depending on system type) setpoint. Verify and document the following:

- Economizer damper closes to minimum position.
- Return air damper opens to normal operating position.
- Relief fan shuts off or relief dampers close.
- Measured minimum outside airflow CFM corresponds to the value found on Standards Mechanical Plan Check document MECH-1, Design O.A. CFM within +/- 10%.
- Mechanical cooling remains enabled until cooling space temperature setpoint is met.

NJ8.2 Built-up Systems Economizer Acceptance

Plan Review

Verify the Plan Review for the following:

- Economizer is specified for all systems as required by the Standards.
- Proper building pressure relief is provided by fan system or relief dampers.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Economizer lockout control sensor is factory-calibrated (proof required) or field-calibrated (fixed or differential dry-bulb or enthalpy sensor depending on system type)
- Outside air flow station is factory-calibrated or field-calibrated *OR* minimum outside air flow is measured and damper position set during system TAB procedures.
- Economizer lockout setpoint complies with Table 144-C per Standards Section 144 (e)3.
- Relief fan system is wired correctly to operate only when the economizer is enabled.
- System controls are wired correctly to ensure economizer is fully integrated (i.e. economizer will operate when mechanical cooling is enabled).
- Economizer lockout control sensor location is adequate (open to air but not exposed to direct sunlight nor in an enclosure; away from sources of building exhaust; at least 25 feet away from cooling towers).

Equipment Start-up

Step 1: Simulate a cooling load and enable the economizer by adjusting the lockout control (fixed or differential dry-bulb or enthalpy sensor depending on system type) setpoint. Verify and document the following:

- Economizer damper modulates opens per Standards Section 144 (e)1A to maximum position to satisfy cooling space temperature setpoint.
- Return air damper modulates closed and is completely closed when economizer damper is 100% open.
- Economizer damper is 100% open before mechanical cooling is enabled.

- Relief fan is operating or relief dampers freely swing open.
- Mechanical cooling is only enabled if cooling space temperature setpoint is not met with economizer at 100% open.

Step 2: Continue from Step 1 and disable the economizer by adjusting the lockout control (fixed or differential dry-bulb or enthalpy sensor depending on system type) setpoint. Verify and document the following:

- Economizer damper closes to minimum position.
- Return air damper opens to normal operating position.
- Relief fan shuts off or relief dampers close.
- Measured minimum outside airflow CFM corresponds to the value found on Standards Mechanical Plan Check document MECH-1, Design O.A. CFM within +/- 10%.
- Mechanical cooling remains enabled until cooling space temperature setpoint is met.

NJ9. Demand Control Ventilation (DCV) Systems

Demand control ventilation is tested on package systems per Standards Section 121 (c)3.

NJ9.1 Packaged Systems DCV Acceptance

Plan Review

Verify the Plan Review for the following:

- Demand control ventilation is specified for all systems as required by the Standards.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Carbon dioxide control sensor is factory calibrated (proof required) or field-calibrated with an accuracy of no less than 75 ppm.
- Outside air flow station is calibrated *OR* minimum outside air flow is measured and damper position set during system TAB procedures.
- The sensor is located in the room between 1ft and 6 ft above the floor.
- System controls are wired correctly to ensure proper control of outdoor air damper system.

Equipment Start-up

Step 1: Simulate a high CO2 load and enable the demand control ventilation by adjusting the demand control ventilation controller setpoint below ambient CO2 levels. Verify and document the following:

- Outdoor air damper modulates opens per Standards to maximum position to satisfy outdoor air requirements specified in Section 121 (c)4, Equation 121-A.

Step 2: Continue from Step 1 and disable demand control ventilation by adjusting the demand control ventilation controller setpoint above ambient CO2 levels. Verify and document the following:

- Outdoor air damper closes to minimum position.
- Measured minimum outside airflow CFM corresponds to the value found on Standards Mechanical Plan Check document MECH-1, Design O.A. CFM within +/- 10%.

NJ10. Variable Frequency Drive Systems

NJ10.1 Variable Frequency Drive Response

Plan Review

Verify the design documentation for the following:

- Discharge static pressure sensor is located properly to achieve desired control.

Construction Inspection

Prior to Performance Testing, verify and document the following:

- Discharge static pressure sensor is factory calibrated (proof required) or field-calibrated.
- Disable discharge static pressure reset sequences to prevent unwanted interaction while performing tests.

Equipment Start-up

Step 1: Simulate a full cooling load condition. Verify and document the following:

- Witness proper response from supply fan (VFD ramps up to full speed; inlet vanes open full).
- Supply fan maintains discharge static pressure within +/-10% of setpoint.
- Measured maximum airflow corresponds to design and/or TAB report within +/-10%.
- System operation stabilizes within a reasonable amount of time after test procedures are initiated (no hunting).

Step 2: Simulate low cooling load condition. Verify and document the following:

- Witness proper response from supply fan (VFD slows fan speed; inlet vanes close).
- Supply fan maintains discharge static pressure within +/-10% of setpoint.
- System operation stabilizes within a reasonable amount of time after test procedures are initiated (no hunting).